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Psychometric Comparison of Dissociative Experiences Scales II and C: A Weak Trauma-Dissociation Link

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Summary: The debate regarding the relationship between dissociation and trauma has raised questions regarding the validity of measures of dissociation. Dalenberg et al.'s (2012) meta-analysis included studies using the Dissociative Experiences Scale (DES II), but excluded the DES-Comparison (DES-C) scale, claiming that it lacked validity as a measure of dissociation. Lynn et al. (2014) contended that omitting those studies might have skewed the results. In the current study, we compared the psychometric properties of both measures in two nonclinical US adult (student, general population) samples to evaluate the convergent and discriminant validity of the scales. We found support for the DES-II as a measure of dissociation as well as the validity and reliability of the DES-C, which compares well to the DES II. Compared with studies in Dalenberg et al., we found lower correlations between trauma and dissociation. No empirical basis exists to exclude studies using the DES-C in literature reviews. Copyright © 2017 John Wiley & Sons, Ltd.

Researchers have long debated the magnitude and meaning of the relation between trauma and dissociative experiences. Carlson et al. (1993) described dissociative experiences as ‘the lack of integration of thoughts, feelings, and experiences’ into consciousness (p. 1030). The classic and widely prevalent trauma theory of dissociation holds that a causal link exists between early life adverse experiences (e.g., childhood sexual and physical abuse) and dissociation (see Janet, 1887, 1889/1973). Nevertheless, in the past few decades, researchers have challenged the extent to which trauma *causes* dissociative symptoms and have identified sociocognitive variables as precursors of dissociative experiences (e.g., suggestions, suggestibility, false memory fantasy proneness, and cultural views of dissociative phenomena; see Spanos, 1994; Lilienfeld et al., 1999; Lynn, Lilienfeld, Merckelbach, Giesbrecht, & van der Kloet, 2012). In contrast to the sociocognitive view, Dalenberg et al.'s (2012) meta-analysis and review claimed to demonstrate a strong relationship between trauma and the Dissociative Experiences Scale (DES II; Carlson & Putnam, 1993). They excluded all studies that had used an alternative version of the DES, the DES-Comparison (Wright & Loftus, 1999)—a choice that Lynn et al. (2014) challenged. In the current studies, we compare the validity and reliability of the DES II and DES-C in two nonclinical samples and further examine the relation between trauma and dissociation.

Dalenberg et al.'s (2012) meta-analysis included studies that used the DES II, the most widely used measure of dissociative experiences (Condon & Lynn, 2014). The DES II possesses high test–retest reliability ($r = .84$; Bernstein & Putnam, 1986) and internal consistency (e.g., split half: .93, Pitblado & Sanders, 1991; Cronbach's alpha: .95, Frischholz et al., 1990). The DES II also correlates with

measures that provide evidence for construct validity (Condon & Lynn, 2013). Carlson et al. (1993) argued that the DES II also shows evidence of sensitivity of 76% when used to screen for patients with a serious dissociative disorder, multiple personality disorder (cf. dissociative identity disorder). Researchers have reported correlations with theoretically relevant variables, such as self-reports of trauma. For example, Dalenberg et al. (2012) reported meta-analytic summed effects ranging from $r = .27$ to $r = .34$ depending on the type of trauma (e.g., sexual, physical, or total summed trauma).

Lynn et al. (2014; see Dalenberg, Brand, Loewenstein, Leavelle, & Dorahy, 2014 for a reply) subsequently raised the concern that Dalenberg et al. (2012) expressly omitted research that relied on an alternative measure of dissociation, the Dissociative Experiences Scale-Comparison (DES-C; Wright & Loftus, 1999). This measure was designed, in part, to reduce floor effects and skew and to provide an alternative to the DES II that provided a wider spread of scores. Bernstein and Putnam (1986) wrote that they expected, and found, a positive skew in the DES scores, especially in nonclinical populations, although they did not report skewness statistics. This skew might be due to the fact that some DES II items (eight items: see Simeon et al., 1998) assess pathological dissociation, whereas others assess dissociative experiences experienced by many in nonclinical samples. In a nonclinical sample, Wright and Loftus (1999) found that the overall DES II distribution was highly skewed (skewness = 2.08), whereas the DES-C distribution exhibited very little skew (skewness = -0.12). Wright and Loftus (1999) further reported Cronbach's alpha for the DES-C as .93 (they also reported the same .93 for the DES II). Although their study did not assess test–retest reliability, they concluded that the DES-C appears to ‘have the best psychometric characteristics’ (p. 511) partly due to the lower skew and the resulting improvement of floor effects.

Whereas the DES II asks participants to rate each of 28 questions regarding dissociative experiences in terms of the percentage of time a particular experience happens on a 0 to 100% scale, the DES-C requires that participants compare how much each experience happens, compared with how

often it happens to others. Both the DES II and DES-C use an 11-point scale with the bottom anchor scored as 0 and the top anchor scored as 100. More specifically, using the same 28 items as the DES II, the DES-C instructs participants to do the following:

Place a check to show how much of the time this happens to you.

Much less than others About the same as others Much more than others

(Wright & Loftus, 1999; p. 502).

Dalenberg et al. (2012) excluded the DES-C from their meta-analysis because they argued that (i) the ability to make such comparative judgments may lie outside the skill set of participants; (ii) the DES-C correlated at only $r = .25$ with the DES II in the original research; and (iii) there was a 'lack of evidence for the DES-C as a valid measure of dissociation' (p. 16). However, Lynn et al. (2014) argued that the DES-C should not have been excluded from a comprehensive review of the literature, because the DES-C not only minimizes skewness, but also correlates with measures that are indicative of validity. Examples of such associations include indices of fantasy proneness (Merckelbach, 2004; $r = .43$ from t test on p. 1377), intrusive images following a 10-min trauma film (Hagenaars & Krans, 2011; $r = .23$), and risk for self-harm (Batey, May, & Andrade, 2010; DES-C subscale r s = .26 and .18, from t tests p. 43).

Importantly, a number of studies support a relation between the DES-C and memory distortions (see Lynn et al., 2014 for a summary). These studies include different types of memory errors, such as responding to leading questions (Wright & Livingston-Raper, 2002), imagination inflation (Heaps & Nash, 1999), false recollection of words (Dehon, Bastin, & Larøi, 2008), false memories of a bus explosion (Dehon et al., 2008), false reports of events from childhood that did not occur (Ost, Foster, Costall, & Bull, 2005), and belief in lies about childhood events (Polage, 2012). Lynn et al. (2014) used a random-effects meta-analysis to estimate a medium weighted effect size of $r = .32$, $p < .001$, which documented a stronger relationship between dissociation and memory distortion compared with what Dalenberg et al. (2012) presented. Notably, the sociocognitive model contends that the relationship between trauma and dissociation may be moderated by memory distortions that inflate reports of childhood traumatic experiences (Lynn et al., 2012). The sociocognitive model also notes that the relationship between trauma and dissociation may be weaker than the association between fantasy proneness and dissociation.

In the present studies, we compare the DES II and the DES-C, as Wright and Loftus (1999) did initially, but in the context of larger samples, an assessment of test-retest reliability, and the inclusion of multiple theoretically relevant measures to document the convergent and discriminant validity of the two scales. For example, we examine the association of the DES scales with an alternative measure of dissociation—the State Scale of Dissociation (SSD; Krüger & Mace, 2002). Moreover, we examine associations with constructs that have been shown to overlap with dissociation,

as gauged by the DES II, such as cognitive failures (Broadbent, Cooper, Fitzgerald, & Parkes, 1982; for correlates with dissociation, see Condon & Lynn, 2014), absorption (Tellegen & Atkinson, 1974; Merckelbach, Horselenberg, & Muris, 2001), and fantasy proneness (Merckelbach, Rassin, & Muris, 2000). We also investigate the overlap of the DES with measures of psychopathology, including depression (Beck, Ward, & Mendelson, 1961) and anxiety (Merckelbach et al., 2000; Zung, 1971). Additionally, we investigate the link between social desirability response/self-presentation bias and dissociation to provide evidence for discriminant validity, as we would not expect dissociation to be robustly associated with such a bias. We also consider whether (i) correlations are over-inflated by a subgroup of participants that over-endorse symptoms on both dissociation and trauma scales (see Merckelbach et al., 2015), and (ii) the influence of floor effects of trauma on the potential link between trauma and dissociation.

We utilize two nonclinical samples to investigate these questions. It is important to include nonclinical samples insofar as Dalenberg et al. (2012) specifically excluded college student samples from their analysis in that they claimed that such samples were 'likely to be biased in favor of low impairment' (p. 559) without justifying the foundation for why such a bias, even if it existed, would warrant exclusion from the data pool. In Study 1, we sampled from a college student population, and in Study 2, we sampled from a general adult population.

To facilitate comparison with previous studies and to provide an opportunity for potentially finding evidence for a robust link between trauma and measures of dissociation, we used the Traumatic Experiences Checklist (TEC; Nijenhuis, Van der Hart, & Kruger, 2002). This scale was previously known as the Traumatic Experiences Questionnaire (TEQ; Nijenhuis, Spinhoven, van Dyck, van der Hart, & Vanderlinden, 1998). We chose this measure because researchers have documented moderate-to-high correlations with the TEC and the DES II—in fact, these comprised some of the highest correlations in the Dalenberg et al. meta-analysis (clinical sample: $r = .61$, Somer, Dolgin, & Saadon, 2001; nonclinical: $r = .40$, Dorahy, Lewis, & Wolfe, 2007; $r = .39$, Somer, 2002).

In summary, we designed the present studies to address questions regarding the psychometric properties and construct validity of an alternative measure of dissociation that has become a focal point of controversy embedded in the larger controversy regarding the link between trauma and dissociation (Dalenberg et al., 2012; Lynn et al., 2014). In Study 1, we investigated these questions in an undergraduate sample, and in Study 2, we verified some of Study 1's findings using a national sample of US adults. In so doing, we examine the appropriateness of considering the DES-C as a valid measure of dissociation that warrants inclusion in future research, literature reviews, and meta-analyses in particular.

STUDY 1

In Study 1, we use a two-session design to investigate the psychometric properties of the DES II and DES-C in undergraduate participants.

METHOD

Participants

Undergraduates from a public university in the southwest of the United States participated for course credit. We recruited participants from the university subject pool using SONA Systems. Of 770 subjects who participated in the study, 54 completed the usually hour-long sessions in less than 20 min, and 113 failed to correctly answer one of four screener-questions that checked whether participants were reading the questions carefully (i.e. ‘Have you ever had a fatal heart attack?’ and questions adapted from Oppenheimer, Meyvis, & Davidenko, 2009). Excluded participants did not differ from included participants on age, gender, or years of education (p 's > .556). Accordingly, we used a dataset of $N = 602$ for analyses. Of these 602 participants, the age range was from 18 to 56 ($M_{\text{age}} = 20.6$, $SD = 3.37$), with 84.2% (507) female, and 15.6% (94) male, with 0.2% (1) self-reporting ‘Other’ (specifying ‘Agender’). Self-identified race/ethnicity was 38.2% (230) Asian, 36.0% (217) Hispanic or Latino, 15.3% (92) White, 2.8% (17) Black, 0.7% (4) Pacific Islander or Native Hawaiian, .2% (1) Native American or Alaska Native, and 6.8% (41) chose ‘other.’

Measures

We discussed the psychometric properties of DES II and DES-C in the introduction, so we will not reiterate this information here. Scores for the DES II and DES-C were calculated by summing all 28 items for each participant and dividing by 28—yielding an average score between the anchors 0 and 100. Here, we introduce the other measures included in the study.

Traumatic Experiences Checklist (TEC)

We selected the self-report TEC (Nijenhuis et al., 1998; Nijenhuis et al., 2002) because it has been found to correlate highly with the DES-II in previous research, and because it provides both a measure of overall trauma and indexes trauma across subscales that gauge emotional neglect, emotional abuse, physical abuse and bodily threat, sexual harassment, and sexual abuse. The questions contain short descriptions that define the events of concern. All items were preceded by the phrase: ‘Did this happen to you?’ The first emotional neglect subscale item is worded in the questionnaire like this: ‘Emotional neglect (e.g., being left alone, insufficient affection).’ Emotional abuse is defined with this wording: ‘(e.g., being belittled, teased, called names, threatened verbally, or unjustly punished).’ Similarly, ‘physical abuse’ is followed by the text: ‘(e.g., being hit, tortured, or wounded.)’ The bodily threat subscale consists of three questions that ask about threat to life, physical pain, and bizarre punishment. Physical abuse and bodily threat are summed together to form a composite. The sexual harassment subscale first question contained the following definition: ‘Sexual harassment (acts of a sexual nature that DO NOT involve physical contact).’ The sexual abuse subscale’s first question provides a definition: ‘Sexual abuse (unwanted sexual acts involving physical contact).’ Some of the questions ask about whether the experience was perpetrated

by family (worded ‘by your parents, brothers, or sisters’), whereas others ask about ‘distant family (e.g., uncles, aunts, nephews, nieces, grandparents),’ and others about ‘non-family members (e.g., neighbors, friends, step-parents, teachers).’ After each item, the participants are asked at what ages the trauma happened, and then asked, ‘How much impact did this have on you?’ on a scale from 1 to 5 ($1 = \text{none}$, $2 = \text{a little bit}$, $3 = \text{a moderate amount}$, $4 = \text{quite a bit}$, $5 = \text{an extreme amount}$). These questions are scored in such a way to count trauma from childhood (ages 0–18) and to give added weight to high self-reported impact (for TEC scoring see Nijenhuis et al., 1998; European Society for Trauma and Dissociation, 2016). Subscales include emotional neglect, emotional abuse, physical abuse/bodily threat, sexual harassment, and sexual abuse. The total trauma composite score is the sum of these subscales.

Alternative measure of dissociation

State Scale of Dissociation

(SSD; Krüger & Mace, 2002). The SSD includes 56 nine-point Likert scale items that measure self-reported state combining seven different dissociative experiences: derealization, depersonalization, identity confusion, identity alteration, conversion, amnesia, and hyperamnesia. The SSD has high internal consistency ($\alpha = .97$) and high split-half reliability. Strong concurrent validity for dissociative diagnoses was demonstrated by statistically significant subscale and total score variation across diagnostic groups, and scores exhibit high convergent validity with DES scores from various diagnostic groups (e.g., major depression; Krüger & Mace, 2002). We used the total score as an index of state dissociation.

Measures that overlap with the dissociation construct.

Cognitive Failures Questionnaire

(CFQ; Broadbent et al., 1982). The CFQ is a 25-item self-reported assessment of errors in perception, memory, and motor function. The CFQ correlated with measures of deficits in memory and absent-mindedness (Broadbent et al., 1982). Two example items are ‘Do you have trouble making up your mind?’ and ‘Do you find you forget what you came to the shops to buy?’ Participants are asked to rate how often they experience such things on a fully anchored 5-point Likert scale from 4 = *very often* to 0 = *never*. Broadbent et al. (1982) reported good internal consistency within the items (Cronbach’s $\alpha = .79$), and good test-retest reliability at 21 weeks ($r = .82$) and 65 weeks ($r = .80$).

Tellegen Absorption Scale

(Tellegen & Atkinson, 1974). The TAS is a 34-item true/false, self-report measure designed to assess one’s propensity towards becoming immersed in one’s experience (Tellegen & Atkinson, 1974). Sample items include ‘I can be deeply moved by a sunset,’ and ‘While watching a movie, a T.V. show, or a play, I may become so involved that I forget about myself and my surroundings, and experience the story as if it were real and as if I were taking part in it.’ Endorsement of more items suggests a greater propensity for

immersion in one's experience. Tellegen (1982) found an internal reliability of $r = .88$ and a test-retest reliability of $r = .91$ for the TAS. The scale correlates with similar measures (see Roche & McConkey, 1990).

The Creative Experiences Questionnaire

(CEQ; Merckelbach et al., 2001; Merckelbach, Muris, & Rassin, 1999) is a 25-item measure of fantasy proneness (for earlier work on this construct see Lynn & Rhue, 1986; Wilson & Barber, 1982). Two example items include: 'Many of my fantasies have a realistic intensity' and 'I am never bored because I start fantasizing when things get boring.' The participants answers 'yes' or 'no' to each question, and the 'yes' answers are summed to provide the overall score. Fantasy proneness is a construct refers to the tendency to fantasize in a deeply imaginative way that can feel real, and whose construct overlaps with the constructs hypnotizability and absorption (Kihlstrom, Glisky, & Angiulo, 1994). Merckelbach et al. (2012) reported that the CEQ had strong correlations with other measures of fantasy proneness, as well as adequate internal consistency (Cronbach's alpha = .72) and good test retest reliability ($r = .95$ at 6 weeks).

Measures of psychopathology

Beck Depression Inventory

(BDI; Beck et al., 1961). The BDI is a 21-item self-report instrument designed to measure depression in adolescents and adults (Beck et al., 1961). Items on the measure include depressive feelings (e.g., sadness and pessimism) and symptoms of depression (e.g., loss of pleasure and interest in sex). For these items, participants rate themselves on a scale of 0 (not experiencing the feeling or symptom) to 3 (experiencing the symptom to a great degree). Total scores can range from 0 to 63, with higher numbers suggesting more severe depressive symptomology. The measure demonstrates convergent validity with correlations to the Hamilton Rating Scale for Depression ranging from .41 to .86 (Hamilton, 1960; Beck, Beck, Steer, & Carbin, 1988) and the Zung Self-reported Depression Scale (ranging from .62 to .83, Zung, 1965; Beck et al., 1988). The BDI also has a high reliability rating with an average Cronbach's alpha of .87, as well as a test-retest reliability ranging from .60 to .90 (Beck et al., 1988).

State-Trait Inventory for Cognitive and Somatic Anxiety

(STICSA; Ree, French, MacLeod, & Locke, 2008; Grös, Antony, Simms, & McCabe, 2007). The STICSA was created to assess cognitive and somatic anxiety in the moment (state) as well as a persistent trait. For undergraduates, the four subscales (trait cognitive and somatic; state cognitive and somatic) had means ranging from 13 to 19 (Ree et al., 2008, their Table 4). In clinical populations with disorders related to anxiety, the subscale means ranged from 20 to 29 (Grös et al., 2007, their Table 5). The STICSA had high internal consistency, with Cronbach alphas of subscales ranging from .75 to .92 (clinical sample range .87 to .92, Grös et al., 2007; undergraduate range .75 to .84). As one would expect, test retest reliability (taken several weeks

apart; Ree et al., 2008, Study 3) was found to be higher in the trait anxiety subscales (cognitive $r = .66$, somatic $r = .60$) compared to the state anxiety scales (cognitive $r = .49$; somatic $r = .31$). These researchers also established the validity of the STICSA in both undergraduates and clinical samples. For example, the STICSA trait subscales correlate more with the trait subscale of the State-Trait Anxiety Inventory (STAI: Spielberger, 1983), compared to the state subscale, and vice versa (undergraduates, Ree et al., 2008; clinical sample, Grös et al., 2007).

Self-report Anxiety Scale

(SAS; Zung, 1971). The SAS is a 20-item survey designed to measure self-reported anxiety 'during the past several days.' This self-report questionnaire records the participant's responses to 20 anxiety-related statements such as: 'I feel more nervous and anxious than usual,' and 'I feel like I'm falling apart and going to pieces.' Fifteen negatively worded statements are scored on a 4-point Likert scale ranging from *a little bit of the time* (scored 1) to *most of the time* (scored 4); and the 5 other statements are reverse coded. The cumulative SAS score gives a self-reported estimate of anxiety, with good internal reliability (split half correlation of .71, Zung, 1971; alpha coefficient = .80).

Additional measures

Social Desirability Scale (SDS; Crowne & Marlowe, 1960). The SDS is a 33 item true/false questionnaire designed to determine the degree to which participants attempt to present themselves in a favorable light (Crowne & Marlowe, 1960). Sample items include, 'I am always careful about my manner of dress,' and 'I am always courteous, even to people who are disagreeable,' with endorsement of more items reflecting a greater propensity towards presenting one's self in a favorable light. Reynolds (1982) found a KR-20 coefficient of .82, suggesting acceptable reliability and high concurrent validity with similar measures.

Design

The basic design of the study, shown in Figure 1, involved first randomly assigning participants in Session 1 into two groups that received either the DES II ($n = 314$) or the DES-C ($n = 288$). One week later in Session 2, participants were again randomly assigned to the DES II ($n = 313$) or DES-C ($n = 289$).

Accordingly, because some participants were administered the DES II (or DES-C) in both sessions, we were able to assess test-retest reliability of these measures. Moreover, some participants received the DES II in one session and the DES-C in the other session, allowing for an examination of correlations between the measures.

Procedure

Participants first signed up for two sessions, exactly a week apart, at the same specific time of day (daytime hours) using SONA Systems. They were instructed how to minimize distractions. Participants answered demographic questions at the beginning of Session 1, followed by the above-

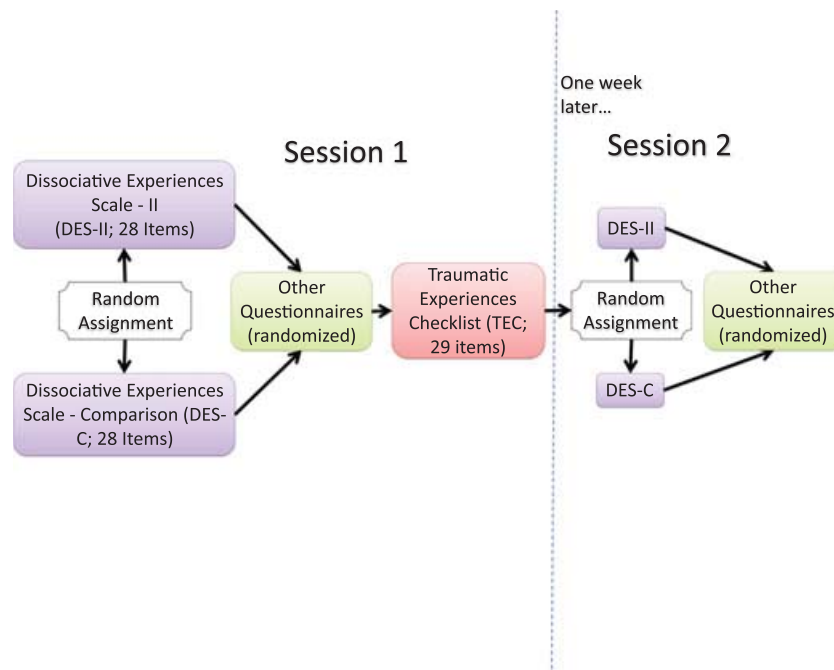


Figure 1. A simplified representation of the basic study design. The ‘other questionnaires (randomized)’ means questionnaire order was randomized (i.e. counterbalanced); the items within questionnaires were not randomized. The ‘other questionnaires (randomized)’ were the same in both sessions [Colour figure can be viewed at wileyonlinelibrary.com]

described measures. After completing the DES II or DES-C at the beginning of each session, participants then completed the measures in a randomized order (order of questionnaires was randomized, not the order of the individual questions within the questionnaires). Participants completed the TEC at the end of the first session, in order to prevent the potentially emotionally arousing questions affecting the answers on other questionnaires. The study was approved for human subjects by the Institutional Review Board (IRB; UC Irvine HS# 2014-1326).

RESULTS

Data analysis plan

We will first present descriptive statistics for the DES II and DES-C, then examine internal and test–retest reliability statistics, and finally assess validity with measures linked with dissociation in previous research or on a theoretical basis (e.g., dissociation, fantasy proneness, absorption, trauma).

Descriptive statistics

As shown in Table 1, the mean score on the overall DES II (an average score of all 28 items) was lower than the DES-C ($t(600) = 11.2, p < .001, d = .91$), and correspondingly the skewness was less with respect to the DES-C ($t(600) = 5.14, p < .001, d = .42$). The Session 1 statistics for the DES II and C (Table 1) were completed first by participants and therefore not affected by other scales and prior participation and, thus, represent the ‘cleaner’ set of statistics.

Reliability

Table 2 presents a number of measures of internal reliability, as well as the test–retest reliability for each scale, with highly comparable findings across both sessions and measures.

Validity

Correlation between the DES II and DES-C

Among those participants who received the DES II in Session 1 and then the DES-C one week later in Session 2,

Table 1. Descriptive statistics of the DES II and the DES-C

	DES II		DES-C	
	Session 1	Session 2	Session 1	Session 2
<i>n</i>	314	313	288	289
Range	0–64.6	0–66.8	0.71–72.1	0–77.1
Mean (<i>SD</i>)	18.5 (12.9)	17.6 (13.8)	30.9 (14.2)	24.9 (16.7)
Skewness (<i>SE</i>)	1.15 (.14)	1.20 (.14)	0.13 (.14)	0.54 (.14)
Kurtosis (<i>SE</i>)	1.11 (.27)	1.08 (.28)	–0.56 (.29)	–0.42 (.29)

Note. *SD* = standard deviation; *SE* = standard error. For comparison, previous non-clinical sample baseline mean scores were DES II = 12.7 and DES-C = 33.3 (Wright & Loftus, 1999).

Table 2. Reliability statistics of the DES II and the DES-C

	DES II		DES-C	
	Session 1	Session 2	Session 1	Session 2
<i>n</i>	314	313	288	289
<i>Internal reliability</i>				
Cronbach's alpha	.936	.952	.917	.950
Split-half correlation	.817	.867	.755	.862
<i>Test-retest reliability</i>	$r = .800, p < .001, n = 161$		$r = .845, p < .001, n = 136$	

Note. Each scale has 28 items. Split-Half correlation refers to the correlation between the first 14 items and the last 14 items on the DES scales. Test-retest reliability was calculated among those participants who received the same DES version in both Session 1 and one week later in Session 2.

the correlation between the DES II and DES-C scores was $r = .717, p < .001, n = 153$, 95% confidence interval (CI) [.630, .786]. Similarly, in those participants who received the DES-C first and the DES II one week later, the correlation was $r = .702, p < .001, n = 152$, 95% CI [.612, .774].

Trauma and dissociation

We calculated the DES II and DES-C correlations with subscales and total scores on the Traumatic Experiences Checklist. As seen in Table 3, both the DES II and DES-C correlated with the total trauma composite. The DES II and DES-C were consistently correlated with the emotional neglect and abuse subscales, not consistently with other subscales, and not statistically significantly with the sexual abuse subscale.

Comparing this nonclinical sample correlation of the DES II and total trauma composite score of $r = .164 (N = 314; 95\% \text{ CI } [.055, .269])$ and Somer's (2002) of $r = .39 (N = 90; 95\% \text{ CI } [.199, .552])$ reveals a statistically significant difference, Fisher $z = 2.03, p = .042$ (p s are two tailed throughout this article). Somer (2012) was cited in Dalenberg et al. (2012) and was compared here because both our study and Somer's used a nonclinical sample, the TEC, and the DES II.

Figure 2 investigates whether the correlation between the DES II and potential trauma exposure was over-inflated by a subgroup of participants who over-endorse symptoms on dissociation and trauma scales (see Merckelbach et al., 2015). In Figure 2, we plot the DES II against total trauma

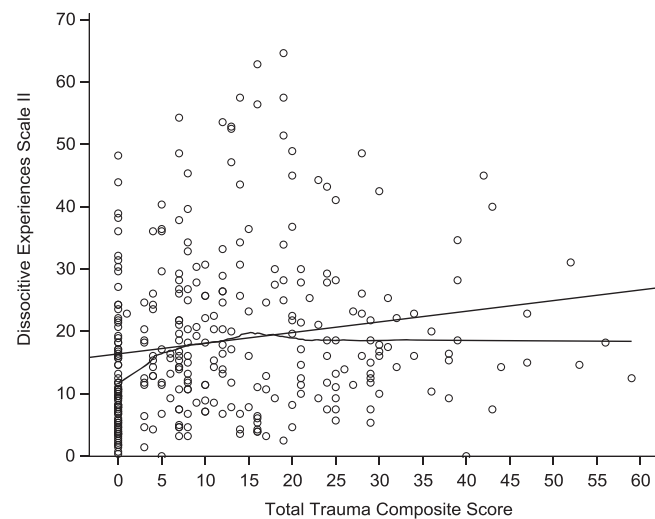


Figure 2. Scatterplot of measures of total trauma composite score (TEC) plotted against dissociation (DES II from session 1). Linear line represents linear correlation, and the non-linear line is a LOESS (locally weighted scatterplot smoothing) line

composite score. The linear fit line corresponds to the correlation given in Table 3 ($r = .164, p = .004; 95\% \text{ CI } [.055, .269])$ and non-linear LOESS (locally weighted scatterplot smoothing) line is also plotted. As can be observed, the gradient of the LOESS line is not higher than the linear correlation line for those participants who scored the highest on the DES II and trauma measures. We focus here on the DES II relationship with trauma due to the

Table 3. Correlations of the DES-II and the DES-C with self-reported sexual, emotional, physical, and overall trauma

	DES-II		DES-C	
	Session 1	Session 2	Session 1	Session 2
<i>Subscales of the TEC</i>				
Emotional Neglect Composite	.230***	.178**	.240***	.258***
Emotional Abuse Composite	.121*	.143*	.197**	.220***
PA/Bodily Threat Composite	.080	.077	.099	.203***
Sexual Harassment Composite	.028	.143*	.074	.069
Sexual Abuse Composite	.029	.071	.027	-.013
<i>TEC summed composite</i>				
Total Trauma Composite	.164**	.182**	.221***	.269***
<i>n</i>	314	313	288	289

Note. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed throughout).

Here we recommend the use of Session 1 scores for the DES-II and DES-C because these measures came before the other scales, including the Traumatic Experiences Checklist (TEC), and thus they could not have been influenced by those measures. Nevertheless, correlations using Session 2 measures of the DES scales are also included here to illustrate the consistency of the findings in each half of the participants. PA = Physical Abuse.

DES II's use in previous research (see Dalenberg et al., 2012), but we should also note that a plot of DES-C scores against total trauma scores revealed an almost identical pattern to the one shown in Figure 2. This indicates that over-endorsers are not artificially inflating correlation coefficients (cf. Merckelbach et al., 2015).

RULING OUT THE INFLUENCE OF TRAUMA FLOOR EFFECTS ON THE TRAUMA DISSOCIATION RELATIONSHIP

In our non-clinical undergraduate sample, a concern could be that the sample may have floor effects for trauma exposure, and these floor effects could consequently reduce the trauma–dissociation relationship. Consequently, we excluded participants who reported zero trauma and reanalyzed trauma–dissociation relationships. The correlation between total trauma composite score and the DES II remained low, $r = .029, p = .659, n = 231, 95\% \text{ CI } [-.100, .157]$. Removing participants with no trauma report did not strengthen the relationship between trauma and dissociation.

Correlates of DES versions and social desirability

Social desirability correlated negatively with the dissociation scales, $r = -.202 (N = 314, 95\% \text{ CI } [-.305, -.094])$ with the DES II and $r = -.250 (N = 288; 95\% \text{ CI } [-.355, -.139])$ with the DES-C. There was no statistically significant difference between these two correlations (Fisher $z = .62, p = .53$). These relatively small effect sizes show that there is discriminant validity with this variable—i.e. both dissociation scales are clearly measuring something different from the inverse of social desirability.

Correlates of both DES versions with related measures, clinical measures

Table 4 presents the correlations between the DES II and DES-C and variables relevant to establishing validity, namely those presumably related and unrelated to dissociation. Both the DES II and DES-C correlated similarly with state dissociation, absorption, fantasy proneness, and cognitive

failures in the range of $r = .400 (95\% \text{ CI } [.299, .492])$ to $.624 (95\% \text{ CI } [.552, .687])$. There were also significant correlations with anxiety and depression measures, in the range of $r = .341 (95\% \text{ CI } [.240, .435])$ to $.463 (95\% \text{ CI } [.368, .549])$. We found no significant differences between the DES II and the DES-C correlations with the variables in Table 4 (Fisher $z_s < 1.59, p_s > .112$).

STUDY 2

Having found equivalent psychometrics of the DES II and DES-C in undergraduates in Study 1, we next determined whether the main findings would generalize to a population of adults in the United States. We also were curious whether the relationship between trauma and dissociation would be low in the general adult population, as we found among undergraduates. In Study 2, we examined the psychometrics of the dissociation scales, as well as the relationship between trauma and dissociation, in a new sample of adults from the US population.

Method

Participants

Adults in the United States participated in a single session online study on Amazon Mechanical Turk for compensation (\$1). Three hundred participants completed the study—we excluded 9 because they indicated in a final question that they had skimmed the questions, and a further 16 who failed to pass a question checking if they were reading the questions carefully—leaving a dataset of 275 that we used for analysis. Participants excluded from analyses were no different on demographic variables age and gender compared with participants who completed the study (p 's $> .206$). Of this sample of 275 for analysis, the mean age was 37.3 (range 19–70; $SD = 11.9$), and 72.4% (199) were female, 27.6% (76) male. Self-reported ethnicity was 7.6% Hispanic or Latino and 92.4% not Hispanic or Latino. Self-reported racial identity was distributed as follows: 1.1% American Indian or Alaska Native, 3.6% Asian, 6.2% Black, 86.5% White, and 2.5% choosing 'more than one race.'

Table 4. Correlations of DES II and the DES-C (from session 1) with conceptually related and clinical variables

	DES II		DES-C	
	<i>r</i>	95% CI	<i>r</i>	95% CI
<i>Conceptually related measures</i>				
State Scale of Dissociation	.440***	[.347, .549]	.400***	[.299, .492]
Absorption (TAS)	.624***	[.552, .687]	.591***	[.511, .661]
Fantasy Proneness (CEQ)	.519***	[.434, .595]	.499***	[.407, .581]
Cognitive Failures Questionnaire	.515***	[.429, .591]	.599***	[.520, .668]
<i>Clinical measures</i>				
Anxiety (Zung's SAS)	.382***	[.284, .472]	.433***	[.335, .522]
State Anxiety (STICSA)	.416***	[.321, .503]	.463***	[.368, .549]
Trait Anxiety (STICSA)	.341***	[.240, .435]	.451***	[.354, .538]
Beck Depression Inventory	.365***	[.266, .457]	.423***	[.324, .513]
<i>n</i>	314		288	

Note. *** $p < .001$.

All measures are taken from Session 1. TAS = Tellegen Absorption Scale. CEQ = Creative Experiences Questionnaire. SAS = Self-reported Anxiety Scale. STICSA = State-Trait Inventory of Cognitive and Somatic Anxiety. SDS = Social Desirability Scale (Marlowe-Crowne)

Procedure

The procedure involved a single session about 30 min in duration, on average. Participants completed some, but not all of the scales described in Study 1, in this order: DES II, state dissociation (SSD), absorption (TAS), fantasy proneness (CEQ), DES-C, and traumatic experiences (TEC). They were then asked if they had skim-read the questions (with an assurance that they would still be compensated), and they then read a debriefing sheet. The University of Southern Mississippi IRB approved the study for human subjects (protocol #16011902).

RESULTS

Data analysis plan

We first documented descriptive statistics of the DES II and DES-C, then examined reliability statistics, and finally evaluated validity by examining associations with measures theoretically relevant to dissociation or measures that were associated with dissociation in previous studies.

Descriptive statistics

Table 5 shows the descriptive statistics for the DES-C and DES-II in Study 2, showing similar patterns to those in Study 1 (Table 1).

Internal reliability

Table 6 presents the internal reliability statistics for the DES II and DES-C for the Study 2 sample of US adults. These statistics are comparable to the high reliability scores found in Study 1.

Validity

Correlation between the DES II and DES-C

In the sample of US adults in Study 2, the correlation between the DES II and DES-C scores was $r = .515$,

Table 5. Descriptive statistics of the DES II and the DES-C in US adult sample ($N = 275$)

	DES II	DES-C
Range	0–61.0	0–84.3
Mean (<i>SD</i>)	14.1 (13.6)	28.9 (18.8)
Skewness (<i>SE</i>)	1.56 (.15)	0.19 (.15)
Kurtosis (<i>SE</i>)	1.95 (.29)	–0.93 (.29)

Note. *SD* = standard deviation; *SE* = standard error.

$p < .001$, $N = 275$, 95% CI [.423, .596]. Note that is moderately lower than the same correlation in the Study 1 sample of undergraduates.

Trauma and dissociation

As seen in Table 7, both the DES II and DES-C correlated with total trauma composite score. The DES II and DES-C were consistently correlated with the emotional neglect and bodily harm subscales, and there was no statistically significant correlation between dissociation and the emotional abuse, sexual harassment, and sexual abuse, subscales. These patterns are somewhat similar to those in the undergraduate sample, with some differences (cf. Table 3).

In Figure 3, we plot the DES II against total trauma composite score. Also plotted on the scatterplot is the linear fit line corresponding to the correlation given in Table 7 ($r = .195$, 95% CI [.079, .306]) and non-linear LOESS (locally weighted scatterplot smoothing) line. The LOESS line demonstrates that the relationship between trauma and dissociation does not become stronger in highly trauma-exposed individuals, and that high-trauma outliers did not inflate the size of the correlation (cf. Merckelbach et al., 2015). A similar plot of DES-C against trauma showed a similar pattern. This reinforces the findings of the undergraduate sample in Study 1, sample of US adults with a wide age range.

Trauma floor effects

As in Study 1, we excluded participants who reported zero trauma and found the correlation between total trauma composite score and the DES II did not increase, $r = .091$, $p = .467$, $n = 66$, 95% CI [–.154, .325] (compare with $r = .195$ before exclusions). Removing participants with no trauma report did not strengthen the relationship between trauma and dissociation.

Correlates of both DES versions with related measures

Table 8 presents the correlations between the DES II and DES-C and variables relevant to establishing validity, namely those presumably related to dissociation. Both the DES II and DES-C correlated significantly with state dissociation, absorption, and fantasy proneness. The magnitude of the correlations between the DES II and state dissociation, absorption, and fantasy proneness was larger than the magnitude of the correlations between the DES-C and those three variables (all Steiger's z s > 2.6 , $ps < .001$; Steiger, 1980).

DISCUSSION

We assessed the comparability of two measures of dissociative experiences: the widely used DES II and the DES-C. The DES-C recently came under critical fire and was excluded from a meta-analysis germane to important theoretical questions regarding the link between dissociation and trauma (Dalenberg et al., 2012). We found strong support for the use of the DES-II in studies of dissociation and dissociative experiences. Nevertheless, contrary to the view that the DES-C lacks validity, we found strong evidence for the general comparability of the psychometric properties

Table 7. Correlations of the DES-II and the DES-C with self-reported sexual, emotional, physical, and overall trauma ($N = 275$) in US adult sample

	DES II		DES-C	
	<i>r</i>	95% CI	<i>r</i>	95% CI
<i>Subscales of the TEC</i>				
Emotional Neglect Composite	.180**	[.064, .292]	.127*	[.009, .241]
Emotional Abuse Composite	.111	[−.007, .226]	.073	[−.045, .189]
PA/Bodily Threat Composite	.235***	[.121, .343]	.137*	[.020, .251]
Sexual Harassment Composite	.035	[−.083, .152]	.015	[−.103, .133]
Sexual Abuse Composite	.073	[−.045, .189]	.038	[−.080, .155]
<i>TEC summed composite</i>				
Total Trauma Composite	.195**	[.079, .306]	.122*	[.004, .236]

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.
PA = physical abuse.

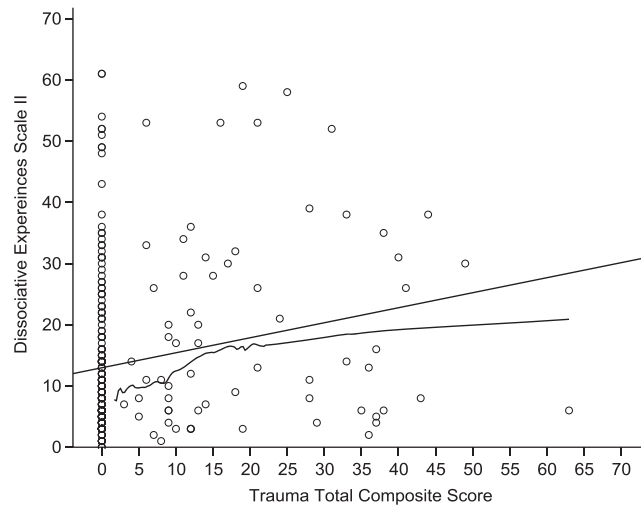


Figure 3. Scatterplot of measures of total trauma composite score (TEC) plotted against dissociation (DES II). Linear line represents linear correlation, and the non-linear line is a LOESS line

of the DES II and DES-C in terms of internal reliability, test-retest reliability, and measures that assess convergent and discriminant validity. Consistent with previous reports (Wright & Loftus, 1999), the DES-C was less skewed compared with the DES II across two studies. Nevertheless, the skew evident in DES-II scores may reflect the distribution of clinically meaningful dissociative experiences in the population.

Notably, our findings were not affected by trauma floor effects, individuals who report high levels of trauma, or individuals who over-endorse symptoms. Social desirability was also not highly correlated with the measures of

dissociation. Additionally, we excluded individuals from the analyses who did not pass screening items for poor attention in completing the items and/or random responding, which most studies in this area have failed to do.

Although individuals scored significantly higher on the DES-C than the DES II, we found evidence for comparability of the two scales across multiple analyses relevant to establishing the psychometric properties of the scales, their relation to each other, and construct validity, more generally. Both scales possess very good internal consistency and test-retest reliability of at least $r = .8$. Our study provides the first demonstration that the DES-C correlates highly with the DES II ($r \sim .7$ in two separate undergraduate groups in Study 1; and $.5$ in a US adult sample in Study 2), a finding that stands at odds with Wright and Loftus’s (1999) original report of a relatively low correlation ($r = .25$). Additionally, the DES-C also correlated moderately with another measure of dissociation, the State Scale of Dissociation (SSD). The correlations between the SSD and the two measures of dissociation were highly comparable in our undergraduate sample in Study 1, further documenting the construct validity of the measures. In Study 2, the DES II showed a larger correlation with the SSD in the US adult sample, but the DES-C was also significantly correlated with state dissociation. It should be noted that Study 1 counterbalanced over two sessions to address order effects, and order effects may confound results in the shorter single session in Study 2. Interestingly, the somewhat lower correlations in Study 2 of the DES-C, compared with the DES II, with measures of absorption and fantasy proneness, may suggest that in an adult US population, at least, the former measure is less related to explanatory constructs associated with a sociocognitive perspective of dissociation.

Table 8. Correlations of DES II and the DES-C with conceptually related variables in the US adult sample in study 2 ($N = 275$)

	DES II		DES-C	
	<i>r</i>	95% CI	<i>r</i>	95% CI
<i>Conceptually related measures</i>				
State Scale of Dissociation	.685***	[.617, .743]	.373***	[.267, .470]
Absorption (TAS)	.690***	[.623, .747]	.412***	[.309, .505]
Fantasy Proneness (CEQ)	.509***	[.416, .591]	.372***	[.266, .469]

Note. *** $p < .001$.
TAS = Tellegen Absorption Scale. CEQ = Creative Experiences Questionnaire. Note that the DES II was always presented first in Study 2.

Nevertheless, we did not find these differences in Study 1, and in Study 2, it is important to underscore the point that correlations of the DES-C with these measures and the measure of state dissociation remained significant.

We selected a measure of trauma (TEC; aka TEQ) because some of the highest correlations reported between trauma and the DES II in the Dalenberg et al. (2012) meta-analysis used this measure (clinical sample: $r = .61$, Somer et al., 2001; nonclinical: $r = .40$, Dorahy et al., 2007). Interestingly, in both undergraduate and US adult samples, the DES-C correlated with the measures of trauma with effects sizes comparable with the correlation between the DES II and trauma, although the effect sizes were low in both cases. Our two studies therefore provide little support for a robust link between reports of traumatic experiences and measures of dissociation, as predicted by the trauma model of dissociation.

One explanation for the lower trauma–dissociation correlations in the nonclinical samples in the present study could be that sociocognitive variables play a moderating role across studies. For example, participants in our sample may have been relatively naïve—compared to clinical samples—that there *should* be, almost by definition, a very strong relationship between trauma and dissociation. Future research could investigate whether such a split in beliefs exists between the public and those involved in relevant clinical practices with respect to beliefs about trauma and dissociation (cf. Patihis, Ho, Tingen, Lilienfeld, & Loftus, 2014). The hypothesis we forward is consistent with the possibility that expectancies regarding the dissociation–trauma link mediate or moderate correlations between trauma and dissociation. Another possible explanation could be that the ways in which our samples had been traumatized differed from past studies reported in Dalenberg et al. (2012). Still, our findings raise the question of whether the hypothesis that trauma causes dissociation can be generalized across different types of trauma and/or trauma severity. Accordingly, it would be worthwhile for future studies to address the reasons for why a robust trauma–dissociation link is not evident in both present samples, in which many participants reported highly adverse and potentially traumatic experiences, as well as in other samples of young adults (e.g. Place, Ling, & Patihis, in press).

The DES-C, like the DES II, correlated with variables that we expected would overlap with dissociation, namely fantasy proneness, cognitive failures, and absorption, based on the sociocognitive model of dissociation. Indeed, the relatively strong correlations of dissociation with these variables—compared to trauma—are arguably consistent with predictions derived from the sociocognitive model of dissociation. Moreover, the correlations of these measures in our research were generally consistent with past findings (Condon & Lynn, 2014; Merckelbach et al., 2001; Merckelbach et al., 2000) and similar in size across the two measures of dissociation in Study 1, providing evidence of convergent validity of the DES-C. In Study 2, correlation coefficients with fantasy proneness and absorption were moderately smaller for the DES-C, compared with the DES II (perhaps due to order effects), but still sizable and statistically significant. These findings are interesting because the

DES II has been the dissociation measure used most to argue for the trauma model (Dalenberg et al., 2012), yet correlates most strongly with variables associated with the sociocognitive model. Importantly, correlations between measures relevant to the sociocognitive model and dissociation assessed across both scales and both studies exceeded the highest correlation between measures of trauma and dissociation. As well as our findings, other research has consistently found that sleep disturbance (a variable highlighted by sociocognitive theory) also correlates with dissociation with moderate effect sizes across 23 studies (e.g., $r = .41$, see van der van der Kloet, Merckelbach, Giesbrecht, & Lynn, 2012).

Paralleling other findings of comparability across measures, correlations were similar between the DES II and the DES-C and indices of psychopathology (i.e., anxiety, state anxiety, trait anxiety, and depression), with the greatest disparity among correlations ranging from only $r = .341$ (DES II, trait anxiety) to $r = .451$ (DES-C, trait anxiety). Shared variance between dissociation and measures of psychopathology highlight the problem of comorbidity of psychological symptoms in drawing inferences regarding the specificity and causal nature of the dissociation–trauma link (see Lynn et al., 2014). In short, we detected no evidence that the DES II is a more valid scale the DES-C, with the exception of somewhat lower, yet still significant correlations, between the DES and conceptually related variables in Study 2. Based on these findings, we concur with Lynn et al. (2014) that there is no reason to exclude studies involving the DES-C from qualitative and meta-analytic reviews such as Dalenberg et al.'s (2012).

In both studies, we found that the subscales for sexual abuse and harassment correlated with dissociation with negligible effect sizes that were not statistically significant. Other subscales, such as emotional neglect, emotional abuse, and physical abuse did correlate significantly with dissociation at least once. It is unclear why this pattern emerges and is surprising given that some extant theories emphasize the effect of sexual abuse on dissociation (e.g., betrayal trauma, Freyd, 1994). Although it is possible that participants might be reluctant to report sexual experiences, it should be noted that our studies were conducted on an anonymous basis and were administered online. Alternatively, it might be argued that the participants had encountered sexual abuse but did not report it due to repressed memory, dissociative amnesia, or motivated forgetting. Nevertheless, this ad hoc hypothesis is speculative and may be difficult or impossible to falsify. Accordingly, it is highly problematic from a scientific perspective.

Our research challenges the Dalenberg et al. (2012) contention that it is wise to exclude college student samples. Indeed, we found highly comparable results across the undergraduate and general adult populations sampled. Accordingly, Dalenberg et al.'s (2012) review paints an incomplete picture of the current literature on the link between dissociation and trauma.

Our research has a number of limitations, including the fact that our findings are limited to generalization to non-clinical samples. Nevertheless, non-clinical samples that are naïve to psychological theory can be useful in testing the generalizability of a theory, and there is no theory we are

aware of that limits generalizations to clinical populations while it excludes nonclinical samples from its purview. Even so, future research comparing the DES-C and DES-II in a clinical sample would be useful. Indeed, it could conceivably be the case that the DES-C ‘performs differently’ across clinical and nonclinical samples. For example, the reference point of comparison may differ. That is, patients may compare themselves with other patients, whereas individuals selected from non-clinical populations may compare themselves with non-patients. Studies that examine this possibility will be important to conduct.

We also excluded a number of undergraduates from Study 1 for not sufficiently engaging in the survey, raising concerns about whether those excluded were different than those who were not excluded. This concern was somewhat obviated by noting that excluded individuals had similar demographics to those included in the analysis. Study 2 also addressed this concern by replicating many of the results in a US adult sample with fewer exclusions. Balancing such concerns, screener-questions like the ones we used have been shown to increase statistical power and data accuracy (Oppenheimer et al., 2009; Berinsky, Margolis, & Sances, 2014), and our rates of exclusion are favorable compared to those found when others utilized four screener questions (in our sample 15% failed to pass all four questions vs. 47% in Berinsky, Margolis, & Sances, 2014, p. 751).

Also, in contrast to the overall demographics of the United States, Study 1 included only 15% White participants, which might raise concerns about generalizability to the US population. However, this limitation is somewhat balanced by Study 2 that included 86% White participants. Another possible limitation is that Study 2 used a simplified short single session procedure whereby the DES II was presented first and the DES-C was presented near the end of the session. However, Study 1 counterbalanced the presentation of DES II and DES-C over two sessions to deal with order effects and question fatigue. In Study 2, the participants may have answered the DES II more carefully than they did the DES-C, which may account for minor differences in results from Study 1 to Study 2. Despite these potential concerns, the results taken together support the conclusion that there is approximate equivalence in psychometric properties of the DES II and DES-C.

In conclusion, we found considerable support for the validity of the DES-II. However, we also found that the DES-C has less skew, similar reliability, and generally comparable validity in relation to the DES II. We also are the first to report moderate to strong correlations between the DES II and the DES-C, supporting the convergent validity of the latter measure. Moreover, across both dissociation measures, we found relatively low correlation with traumatic experiences, most notably sexual abuse. Our findings are encouraging for the use of the DES-C and the DES II in both future research and meta-analyses of past research.

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